

National Climatic Data Center

DATA DOCUMENTATION

FOR

DATA SET 3211 (DSI-3211)

**SUMMARY OF THE DAY - FIRST ORDER ASOS
(AUTOMATED SURFACE OBSERVING SYSTEM)**

March 18, 2003

National Climatic Data Center
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1. **Abstract:** The [Automated Surface Observing Systems](#) (ASOS) program is a joint effort of the National Weather Service (NWS), the Federal Aviation Administration (FAA), and the Department of Defense (DOD). The ASOS systems serves as the nation's primary surface weather observing network. The observations are minute-by-minute are generally recorded for the 24-HR period midnight to midnight. The major parameters included within this data set are: temperature, dew point, pressure, sky conditions, precipitation amount, wind variables, visibility, present weather information and special weather occurrences.

In September 1992, the NWS began implementation of the Automated Surface Observing System (ASOS) with four sites. Implementation continues with total ASOS stations nearing 900 in 2000. This data set begins with the October 2000 data, following the same conventions as DSI-3210. It must be noted that NCDC has the observations from the time the station opened, but the [NWS](#) has the current data. Official surface weather observation standards can be found in the [Federal Meteorological Handbook](#).

2. **Element Names and Definitions:**

RECORD TYPE

The type of data stored in this record. (Value is "DLY"). Each record contains one month of daily values.

STATION-ID

This eight-digit numeric identifier (WBAN STATION NUMBER) is assigned by the National Climatic Data Center. The first 3 digits are zero's. WBAN NUMBER is a 5 digit number formulated to designate the station. A list of stations with their coordinates, elevation and period of record is available upon request. Values range from 00000001 through 00099999.

METEOROLOGICAL ELEMENT-TYPE

The type of meteorological element stored in this record is given as a 4-Character alphanumeric acronym. The following list denotes the specific elements contained in DSI-321X. To determine which units are used for each element-type you must read Tape Field 004 "Element-Units" (Reference Table "A").

AWND

Average Daily Wind Speed. Units expressed in miles per hour to tenths.

CLDG

Cooling Degree Day. Base 65 degrees Fahrenheit.

DPNT

Departure from Normal Temperature. DATA-VALUE = -00099 to b00099 degrees Fahrenheit.

DPTP

Average Daily Dew-Point Temperature. Units expressed in tenths of degrees Fahrenheit.

DYSW

Daily Occurrence of WEATHER. These two digit DYSW element codes are stored in the rightmost four digits of the VALUE portion of the DATA-VALUE field. Within the four digits used, the weather codes are entered left justified.

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Thus, if one type of weather occurs during a day the VALUE field would appear as OXX00 where XX is the appropriate weather code. If two types of weather occur the VALUE field will contain OXXYY where XX is value 1 and YY is value 2. If more than 2 types of weather occur on the same day, they will be stored in additional DYSW records as needed. (Reference Table "A1")

DYVC

Day with Weather in the Vicinity. The present (or prevailing) weather occurring at the time of the observation in the vicinity of the station, between 5 and 10 statute miles of the point of observation.

NOTE: This element is coded in the same manner as the element DYSW. See the description for DYSW for details. (Reference Table "A1")

F2MN

Fastest 2-minute Wind Direction and Speed. Direction is expressed in tens of degree from true north. Speed is expressed in miles per hour. When two or more equal speeds have occurred, the most recent speed and direction are entered.

Example of DATA-VALUE field XYYYY for wind direction and speed: 22048. Wind is from 220 degrees at 48 miles per hour.

F5SC

Fastest 5-second Wind Direction and Speed. Direction is expressed in tens of degrees from true north. Speed is expressed in miles per hour. When two or more equal speeds have occurred, the most recent speed and direction are entered.

FMTM

Time of Fastest 2-minute Wind. Units are expressed in hours and minutes.

HTDG

Heating Degree Days. Base 65 whole degrees Fahrenheit.

MNRH

Minimum Relative Humidity. DATA-VALUE = b00000 to b00100, expressed in whole percent.

MNTP

Average Temperature. The value is the (Max Temp. + Min Temp.)/2, expressed in whole degrees Fahrenheit.

MXRH

Maximum Relative Humidity. DATA-VALUE = b00000 to b00100, expressed in whole percent.

PRCP

Daily Precipitation. Rainfall and melted frozen precipitation are included. Trace is less than .005 inch. DATA-VALUE = b00000 to b09999 expressed in hundredths of inches.

PRES

Average Daily Station Pressure. Based on eight 3-hourly observations per day. Units expressed in thousandths of inches of Mercury.

PSUN

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Daily Percent of Possible Sunshine. Data Value = b00000 to b00100, expressed in percent.

RDIR

Resultant Wind Direction. DATA-VALUE expressed to the nearest whole degree code.

RWND

Resultant Wind Speed. DATA-VALUE is expressed in miles per hour to tenths.

SLVP

Average Daily Sea Level Pressure. DATA-VALUE expressed in tenths of millibars.

SNOW

Daily Snowfall. Hail is included with snowfall. Amount includes sleet/ice pellets. DATA-VALUE = b00000 to b09999 expressed in tenths of inches. Trace of snow is less than .05 inch.

SNWD

Snowdepth at Observation Time. Hail is included with snowfall. (Reference Table "E")

TMAX

Daily Maximum Temperature. DATA-VALUE = -00199 to b00199, expressed in whole degrees Fahrenheit.

TMIN

Daily Minimum Temperature. DATA-VALUE = -00199 to b00199, expressed in whole degrees Fahrenheit.

TMPW

Average Daily Wet-Bulb Temperature. DATA-VALUE = -00199 to b00199, expressed in whole degrees Fahrenheit.

TSUN

Daily Total Sunshine. DATA-VALUE = b00000 to b01440, expressed in minutes. (Reference Table "F")

WTEQ

Water Equivalent of Snow on the Ground. Reported only when there are 2 inches or more of snow on the ground. Readings were generally taken at 1800 GMT. DATA-VALUE expressed in tenths of inches.

METEOROLOGICAL ELEMENT MEASUREMENT UNITS CODE.

(Reference Table "A")

YEAR

This is the year of record. Range of values - 2000 to current year processed.

MONTH

This is the month of the record. Range of values is 01 to 12.

SOURCE CODE-1

Contains a code indicating the primary source of the original record for this element. Range is 1-9 and A -Z. (Reference Table "G")

SOURCE CODE-2

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Contains a code indicating the backup source of the original record for this element. Range is 1-9 and A - Z. (Reference Table "H")

NUM-VALUES

This notates the actual number of values reported. Range = 001 to 062.

NOTE: A record may contain fewer data values than you might expect. A monthly record of daily values may contain as few as 1 data value or as many as 31 data values.

If a particular data value was not taken or is unavailable there is no entry for it.

DAY

Contains the day of the daily element value. Range = 01 to 31. Data are for the 24 hour period midnight to midnight LST.

HOURL

Contains the hour of the daily observation. Hour is reported as 24 representing a 24 hour period midnight to midnight.

SIGN of

This is the "SIGN" of the meteorological Data Element Value. This field contains either a blank or a minus sign (never a plus sign).

DATA-VALUE

Actual data value. The DATA-VALUE (DATA ELEM VALUE) portion of the tape field is a five digit integer. One major exception does exist however, DYSW (days with weather code and days with weather in the vicinity) element-type values are explained under METEOROLOGICAL ELEMENT-TYPES DYSW and DYVC.

FLAG1

The Data Measurement Flag. (Reference Table "J")

FLAG2

Data Quality Flag. (Reference Table "K")

***** TABLE "A" *****

METEOROLOGICAL ELEMENT MEASUREMENT UNITS CODE

The units and decimal position of the data value for this record. Range of values is listed below.

C	Whole degrees Celsius
CM	Centimeters
D	Whole Fahrenheit degree days
DT	Wind direction in tens of degrees
DW	Wind direction in whole degrees
F	Whole degrees Fahrenheit
FN	Feet and tenths
FT	Whole feet
HF	Hundreds of feet
HI	Hundredths of inches
HM	Hundredths of miles

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HR Time in hours and minutes
 HT Hundredths of inches but observation was only made to tenths
 I Whole inches
 IH Hundredths of inches of mercury
 IT Thousandths of inches of mercury
 KD Knots and direction in tens of degrees
 KS Knots and direction in 16 pt. code
 M Whole miles
 MD MPH and direction in tens of degrees
 ME Whole meters
 MH Miles per hour
 MM Millimeters
 MN Minutes
 MS MPH and direction in 16 pt. code
 MT Tenths of millibars
 NA No units applicable (none-dimensional)
 N1 No units applicable - element to tenths
 N2 No units applicable - element to hundredths
 OS Oktas of sky cover
 P Whole percent
 TC Tenths of degree Celsius
 TD Tenths of Fahrenheit degree days
 TF Tenths of degrees Fahrenheit
 TH Tenths of hours
 TI Tenths of inches
 TK Tenths of knots
 TL Tenths of miles per hour
 TM Tenths of millimeters
 TP Tenths of percent
 TS Tenths of sky cover

Note: All single digit Element-Units are left justified and blank filled.

***** TABLE "A1" *****

DYSW/DYVC

00 No occurrence
 01 Day with haze (see code 30 in this table)
 02 Day with fog (see code 17 in this table)
 03 Day with heavy fog
 04 Day with drizzle
 05 Day with ice pellets (sleet and small hail; see code 31 in this table)
 06 Day with glaze
 07 Day with thunder
 08 Day with hail (1/4 inch or larger in diameter)
 09 Day with volcanic ash (see codes 27 and 29 in this table)
 10 Day with blowing snow (includes drifting snow)
 11 Day with high wind (squall; speeds increasing to at least 16kts/18mph and sustained at 22kts/25mph or more for at least one minute;)
 12 Day with tornado (see codes 20 and 21 in this table)
 13 Day with snow (see codes 22, 23, 24 in this table)
 14 Day with rain
 15 Day with freezing rain
 16 Day with freezing drizzle
 17 Day with ice fog (includes freezing fog)
 18 Day with blowing spray (includes spray)
 19 Day with unknown source of precipitation

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20 Day with funnel cloud
 21 Day with waterspout (includes tornado)
 22 Day with snow pellets (see code 31 in this table)
 23 Day with snow grains
 24 Day with ice crystals
 25 Day with ground fog
 26 Day with dust
 27 Day with blowing dust (includes duststorm when visibility is reduced to less than 5/8 miles)
 28 Day with blowing obstruction
 29 Day with blowing sand (also includes sand as well as sandstorm when visibility is reduced to less than 5/8 mile
 30 Day with smoke
 31 Day with small hail and/or snow pellets (diameter less than 1/4 inch)
 32 Day with well developed dust/sand whirls
 33 Day with mist
 34 Day with rain or snow shower; used in reference to weather in the vicinity only

***** TABLE "B1" *****

FSIN

WIND DIRECTION CODE (16 Point WBAN Code)

12 = NNE	66 = SW
22 = NE	76 = WSW
32 = ENE	77 = W
33 = E	78 = WNW
34 = ESE	88 = NW
44 = SE	18 = NNW
54 = SSE	11 = N
55 = S	00 = Calm
56 = SSW	= Unknown

Example of DATA-VALUE field XYYYY for wind direction and speeds: 12037 Wind is from the NNE at 37 miles per hour.

***** TABLE "B2" *****

PKGS

WIND DIRECTION CODE (36 Point WBAN Code)

03 = NNE	21 = SSW
05 = NE	24 = SW
07 = ENE	25 = WSW
09 = E	27 = W
12 = ESE	30 = WNW
14 = SE	32 = NW
16 = SSE	34 = NNW
18 = S	36 = N

***** TABLE "C" *****

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:
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FSMI & FSMN

WIND DIRECTION CODES

00 = Calm
01 = 010
02 = 020
" "
" through "
36 = 360
99 = Unknown

***** TABLE "E" *****

SNWD

DEPTH of SNOW OBSERVED AT: 12:00 GMT

DATA-VALUE = b00000 to b09999 in whole inches. Trace of snow depth is less than 0.5 inches. Some Alaska and part-time stations take snow depth measurements at different hours.

***** TABLE "F" *****

TSUN

Conversion of minutes to tenths of hours is:

MIN	TENTHS		
1-2	0.0	33-38	0.6
3-8	0.1	39-44	0.7
9-14	0.2	45-50	0.8
15-20	0.3	51-56	0.9
21-26	0.4	57-60	1.0
27-32	0.5	A	ASOS

***** TABLE "G" *****

SOURCE CODE TABLE 1

1 - Original Manuscript
A - ASOS

Source codes reflect normally expected sources and do not necessarily indicate actual source of a specific item.

***** TABLE "H" *****

SOURCE CODE TABLE 2

1 - Original Manuscript
A - ASOS

***** TABLE "J" *****

FLAG1 TABLE

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- A - Accumulated amount. This value is the amount accumulated since the last measurement. (SNOW, SNWD, PRCP)
- B - Accumulated Amount. Value includes estimated values. (SNOW, SNWD, PRCP)
- D - Derived Value.
- E - Estimated Value.
- M - Data Element Missing. This is for fixed length records only.
- S - Included in a Subsequent Value. This precipitation amount is being accumulated. Total will be included in a subsequent value. (TPCP, SNOW, SNWD)
- T - Trace of Precipitation, Snowfall or Snow depth. Value would be '00000'. (TPCP, SNOW, SNWD)
- b - (blank) Not needed.

***** TABLE "K" *****

FLAG2 TABLE

- 0 - Observed data has passed all internal consistency checks
- 1 - Validity indeterminable
- 2 - Observed data has failed an internal consistency check - (subsequent edited value follows observed value)
- 3 - Observed data has failed an internal consistency check.
- 4 - Observed data value invalid.
- D - Wind direction code is invalid (PKGS through December 1983 only)
- E - Edited data value passes all systems checks - no observed value present
- S - Manually edited value passes all systems checks

3. **Start Date:** 20001001

4. **Stop Date:** Ongoing

5. **Coverage:** Global coverage.

Southernmost Latitude: 90S
 Northernmost Latitude: 90N
 Westernmost Longitude: 180W
 Easternmost Longitude: 180E

North America, Caribbean Islands, Pacific Islands, overseas stations of the NWS and FAA.

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6. **How to Order Data:**

Ask NCDC's Climate Services about costs of obtaining this data set.

Phone: 828-271-4800

Fax: 828-271-4876

E-mail: NCDC.Orders@noaa.gov

7. **Archiving Data Center:**

National Climatic Data Center

Federal Building

151 Patton Avenue

Asheville, NC 28801-5001

8. **Technical Contact:**

National Climatic Data Center

Federal Building

151 Patton Avenue

Asheville, NC 28801-5001

Phone: 828-271-4800

9. **Known Uncorrected Problems:** None.

10. **Quality Statement:**

This data set is produced from ingested ASOS Summary of the Day data. The data are examined by routines that perform gross limits checks, internal consistency checks and climatological limits checks. Discrepant data are flagged. This data set should be used with the knowledge that these are "raw" data as received from the station. Flagged data may be erroneous or merely the data failed a check.

11. **Essential Companion Datasets:**

DSI-3211 requires use of NCDC's in-house Station History file.

12. **References:**

National Weather Service, 1993: National Weather Service Observing Handbook No. 7, Surface Observations, NOAA-NWS, Silver Springs MD.

National Weather Service, June 1992: ASOS Users Guide, NOAA-NWS, Silver Springs, MD.

National Weather Service, April 1988: Surface Observations, Federal Meteorological Handbook No. 1 (FCM-H1-1988), Office of the Federal Coordinator, Dept of Commerce, Washington, D.C.

Federal Coordinator for Meteorological Services and Supporting Research, October 1992: Surface Aviation Observations, Federal Meteorological Handbook No. 1 (revised (FCM-H1-1991)), Office of the Federal

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